CLAIMS

1. A semiconductor device using a III-V group compound semiconductor single crystal comprising:

a doped III-V group compound semiconductor single crystal epitaxial layer;

a Si-layer formed on said III-V group compound semiconductor single crystal epitaxial layer; and

a metal electrode formed on said Si-layer as an ohmic electrode.

2. The semiconductor device according to claim 1, wherein said III-V group compound semiconductor single crystal epitaxial layer is n-type doped, and said metal electrode is an ohmic electrode for electrons.

3. The semiconductor device according to claim 1, wherein said III-V group compound semiconductor single crystal epitaxial layer is p-type doped, and said metal electrode is an ohmic electrode for holes.

4. The semiconductor device according to any one of claims 1 to 3, wherein said III-V group compound semiconductor single crystal is a single crystal composed of any one selected from the group consisting of GaAs, InGaAs and InP.

5. The semiconductor device according to any one of claims 1 to 4, wherein said Si-layer is a single crystal layer epitaxially grown on said III-V group compound semiconductor single crystal epitaxial layer.

6. The semiconductor device according to any one of claims 1 to 4, wherein said Si-layer is formed on said III-V group compound semiconductor single crystal epitaxial layer as a polycrystalline layer or an amorphous layer.

7. The semiconductor device according to any one of claims 1 to 6, wherein said metal electrode comprises aluminum.

8. A method for producing a thin film crystal wafer for a III-V group compound semiconductor device, comprising the steps of:

laminating required compound semiconductor thin film crystal layers on a semiconductor substrate by epitaxial growth to obtain a III-V group compound semiconductor single crystal; and

forming a Si-layer on said III-V group compound semiconductor single crystal by epitaxial growth,

wherein said steps are performed in a same epitaxial growth furnace.

9. The method according to claim 8, wherein said epitaxial growth is performed by a metal organic vapor phase epitaxy method (MOVPE method) or a molecular beam epitaxy method (MBE method).

10. The method according to claim 8, wherein said III-V group compound semiconductor single crystal is a GaAs single crystal.

11. The method according to claim 8, wherein,

when said Si-layer is formed, a thin film layer of said III-V group compound semiconductor single crystal to be joined to said Si-layer is n-type doped with Si.

12. The method according to claim 8, wherein a thin film layer of said compound semiconductor single crystal contains As, and, when said Si-layer is formed, said Si-layer is n-type doped with As in a thin film crystal layer of said III-V group compound semiconductor single crystal to be joined to said Si-layer.

13. The method according to any one of claims 8 to 12, wherein said Si-layer is formed as a single crystal layer, a polycrystalline layer or an amorphous layer.

14. A method for producing a semiconductor device using a III-V group compound semiconductor single crystal, comprising the steps of:

laminating required compound semiconductor thin film crystal layers on a semiconductor substrate by epitaxial growth to obtain a III-V group compound semiconductor single crystal;

forming a Si-layer on said III-V group compound semiconductor single crystal by epitaxial growth,

wherein said steps are performed in a same epitaxial growth furnace; and then

forming a metal electrode acting as an ohmic electrode on said Si-layer.